From: **DANIEL ALVAREZ ZAPATEL** dalvarez@conicyt.cl
Subject: FONDECYT-CHILE - Request to review research proposal N°1211168 - Evaluator Mr. JOSE VAZQUEZ
Date: November 24, 2020 at 6:42 AM
To: javazquez@icf.unam.mx

DZ

Agencia Nacional de Investigación y Desarrollo
Ministerio de Ciencia, Tecnología, Conocimiento e Innovación
Gobierno de Chile

Dear Mr. JOSE VAZQUEZ,

I am reaching out to you on behalf of the National Fund for Scientific and Technological Research (FONDECYT) of the National Research and Development Agency (ANID by its acronym in Spanish) of the Science, Techr name was suggested by the ASTRONOMY, COSMOLOGY & PARTICLES Evaluation Group – EG (https://evalfondecyt.anid.cl/archivo/GE/2021/GE34_en.pdf), to request your collaboration to review the following propo National Projects Competition:

Proposal number: [redacted]
Submitted by: [redacted]
Tittle: [redacted]
Abstract: View Abstract 1211168_Resumen_Abstract.pdf

Your review, which is ad honorem, consists of assigning a score and providing comments about the quality and viability of the proposal, reporting on aspects such as: Is the state of the art well documented and up methodologies consistent? How novel is the proposal? Is the workplan consistent with the described methodology and the duration of the project? Does the work team have the capacity to execute the proposal?.

Should you accept our request, we would be grateful if you could send us your review by 10-12-2020 (day-month-year). However, if you require a short extension to this deadline, or if you have any questions or doubts r contact us by sending an email to Mr. DANIEL ALVAREZ ZAPATEL dalvarez@conicyt.cl.

If you are willing to review the proposal, please click HERE or follow the link:
https://evalfondecyt.anid.cl/index.php/evaluador/ver_invitacion/desde_email/W3lUcgByVmoDPlY2UWkHNABjBmIGRgNAVTRTOFA8AmRXZVc1CmoJP1s6BGYBNlxrAjZSQlMaBmpWZAM4UT4DbQ5oATgHYlMyVktTTAo0VyNbaFRuAGlWOQMyVmdROwdnACYGIA

If you are unable to accept our invitation at this time, please register your decision HERE or follow the link:
https://evalfondecyt.anid.cl/index.php/evaluador/ver_invitacion/desde_email/ByVUcgNxU29UaQJiATlVZlAzUjZXFwdEBGVVPls3AGZSYFc1A2MEMgJjBGZWYVNkBzMDEwZPUDxcbggzUT4DbVQyVWwHYlY3BxpTTAQ6UCQHNFRuA2pTPFRlAlABbVUzUG5SYVcl
Thank you in advance for your time. We look forward to counting with your valuable help, which will allow us to ensure the transparency of the selection process and the adequate allocation of Chilean State funds.

Cordially yours,

Alejandra Vidales Carmona
Deputy Director
Sub-Directorate for Research Projects
FONDECYT Program
National Research and Development Agency (ANID by its acronym in Spanish)

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ABSTRACT:

Name of Responsible Researcher:	**Ramón Herrera Agabiaza**
Project Title:	**Reconstructing Inflation**

Describe the main issues to be addressed: objectives, methodology and expected results. **The maximum length for this section is 1 page** (use letter size format, Verdana font size 10 or similar).

We aim in this proposal to rebuild some cosmological models to describe the evolution and cosmic expansion during the early universe, through an inflationary epoch. In order to give account of the different cosmic expansions of the universe and its evolution, we will assume some k-essence Lagrangian densities, in order to rebuild the inflationary scenario. In this context, from the Friedmann Robertson Walker metric, we shall consider that the universe will be spatially flat and for the matter content of the universe, we will consider a single standard scalar field or a fluid.

In relation to the early universe and its description thought the inflationary k-essence models, we will analyze the reconstruction the background variables, considering the attractors or observables and also under theoretical foundation from Swampland Criteria (SC).

In the context of the reconstruction, we will rewrite the background variables and its derivatives in terms of the number of e-folds N, under the slow roll approximation. Later, we will assume the attractor point as, the scalar spectral index and tensor to scalar ratio or also the slow-roll parameters or the EoS as a function of e-folds N. In order to unify the criteria given by the SC with the attractors, we will rewrite the second SC as a function of the number N. In this form, we will write the scalar spectral index n_s and the rate r in terms of the slow roll parameters and after we will also rewrite the slow roll parameters as functions of number N. Under this methodology, we will obtain the observables $n_s(N)$ and the rate $r(N)$ or the EoS together with the second SC in terms of the background variables and its derivatives.

By assuming the attractors and from SC for the reconstruction, we could consider different expressions or ansatze for the spectral index $ns(N)$, ratio $r(N)$, EoS or slow roll parameters together with the second SC, in order to solver analytically these variables as a function of N. Later, we will obtain the reconstruction of the background variables in terms of the scalar field, through the relation between the e-foldings N and the scalar field. Additionally, we will analyze the first SC in relation to the range of the inflaton as a function of the number N and from the reconstruction of the variables, we will evaluate this condition in the parameters-space.

From the observational data, we will fix the constraints on the parameters in these inflationary k-essence models, and additionally we will use the criteria or conjectures from the SC, in order to restrict the parameters-space even more. In this way, under the unification of the attractors (observational conditions) and SC (theoretical conditions), we will find the best fit of the parameters for a specific reconstruction from a k-essence model. Additionally, we will compare our model and its parameters-space with respect to the GR theory if necessary. Also, in the reconstruction of this k-essence inflationary model, we will pretend to discern what k-essence model or Lagrangian works (or does not work) and its parameters-space from observational data together with the compatibility of SC.

We aim in this proposal to implement an innovation in the methodology for the reconstruction of inflation, introducting two requirements; the observational (attractors) and the theoretical (SC) foundations. Thus, with this innovation in the reconstruction of the background variables, we will achieve to obtain better results on the constraints of the different parameters and variables (effective potential, coupling parameters) of our models in relation to another reconstruction analysis realized in the literature.